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Agroscope

Influence of a supplementation in probiotics and vitamins on postnatal development of piglets

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EAAP

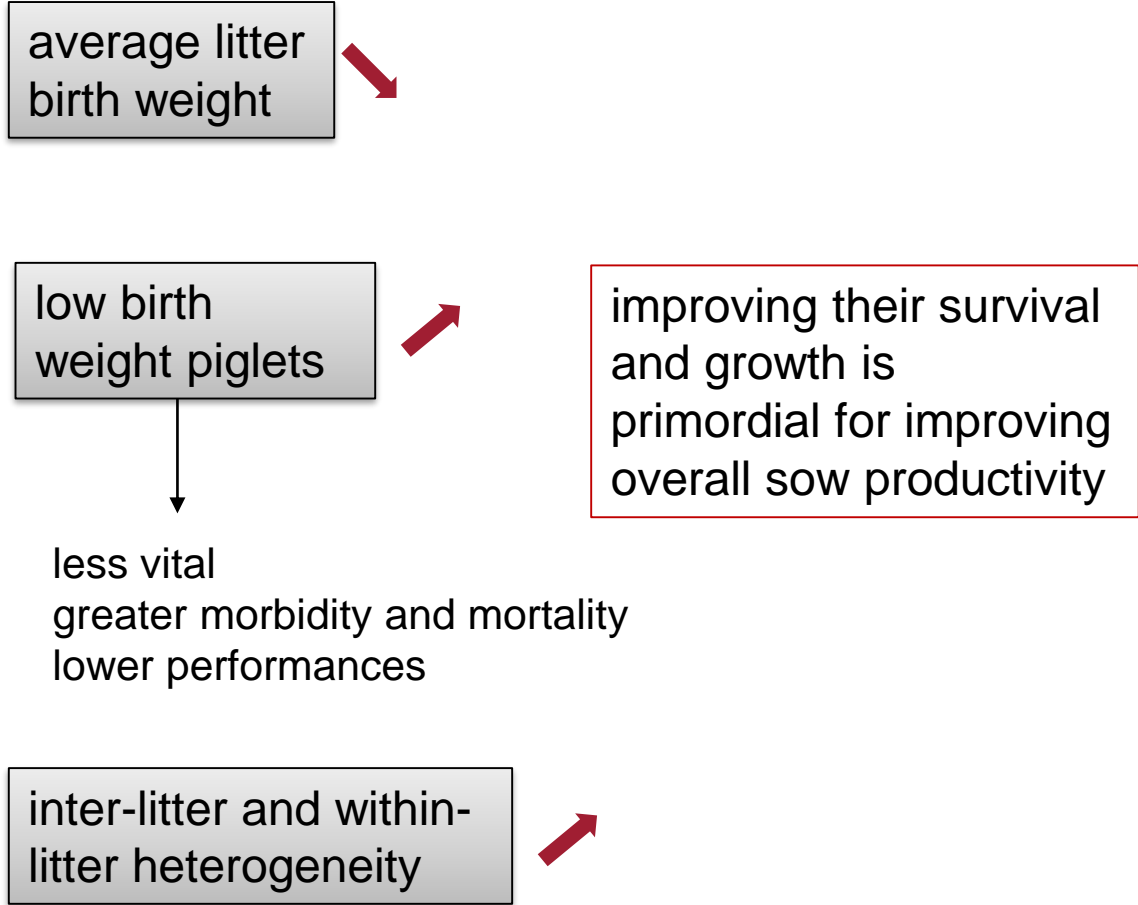
European Federation of Animal Science

Ghent, Belgium

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Problems related to hyperprolificacy





Goal of the experiment

Early-life colonization of the gut is of great importance for the future life and performance and health of the pigs

- Importance of colostrum and milk
- Other molecules such as **pre- and pro-biotics** and **vitamins** may enhance colonization of the gastrointestinal tract of the young pig (Wang *et al.*, 2016).

Goals of the experiment:

1) Determine whether a **single dose** of a commercial **supplement (S)** containing vitamins A, E, selenium, immunoglobulins, prebiotics (inulin) and probiotics (*Enterococcus faecium* and *Saccharomyces cerevisiae*) impact **piglet growth** from birth to 2 weeks post-weaning (PW) and the occurrence of **diarrhea**.

2) Are there **differences** between **slow growth** and **fast growth** piglets in terms of **microbiota** and **volatile fatty acids**?

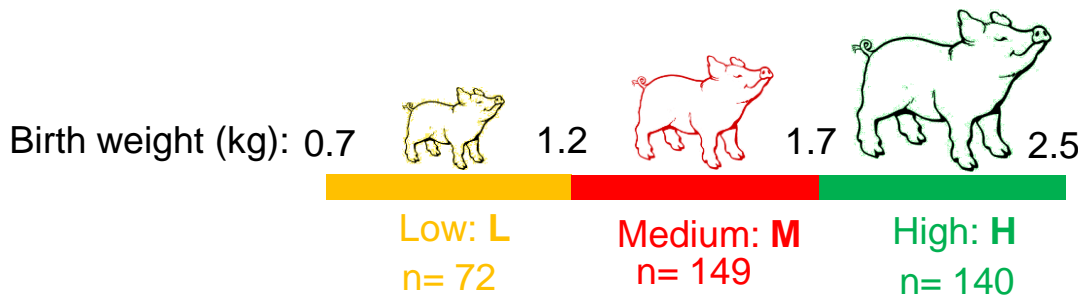
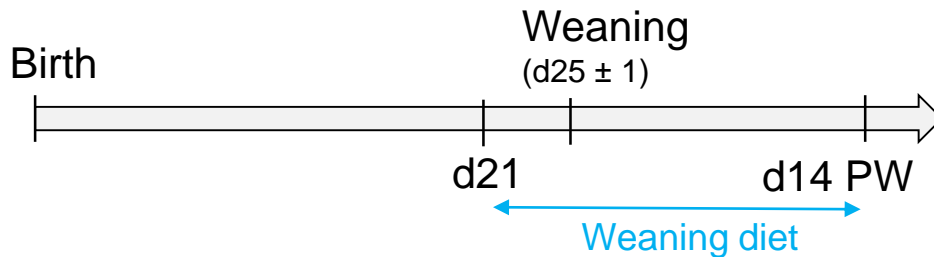


Experimental design

At birth, a total of 361 piglets from 28 litters received:

S-: 2 ml of **water**
186 piglets (14 litters)

S+: 2 ml of **supplement**
175 piglets (14 litters)



Crude protein.....	150 g/kg
Crude fat:	351 g/kg
Crude fiber:	4 g/kg
Vitamin E:.....	39'875 mg/kg
Vitamin A:	1'362'500 IU/kg
Vitamin D3:	256'000 IU/kg
Selenium.....	48 mg/kg
<i>Saccharomyces cerevisiae</i> :	
.....	5.10 ¹² CFU/kg
<i>Enterococcus faecium</i> :	
.....	3.10 ¹² CFU/kg

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Measurements

- Growth performances:
 - Piglet weights at birth, d2, d5, d16, d21, at weaning, d7 PW and d14 PW

- From d21 onwards:
 - Feed intake per pen
 - Occurrence of diarrhea

- Volatile fatty acids (VFA) profile in the feces:
 - At d16 and d14 PW
 - 2 females per litter (8 litters S- and 8 litters S+): according to their birth weight and growth performances from birth to d16 of life



Statistical analysis

- MIXED or GLIMMIX procedure of SAS (version 9.4)
- Fixed effects:
 - Supplement [S- and S+]
 - Category [L, M and H]
 - (Growth rate [slow- and fast-growth])
 - (Sampling time)
 - Their first and second order interactions

- Random effects:

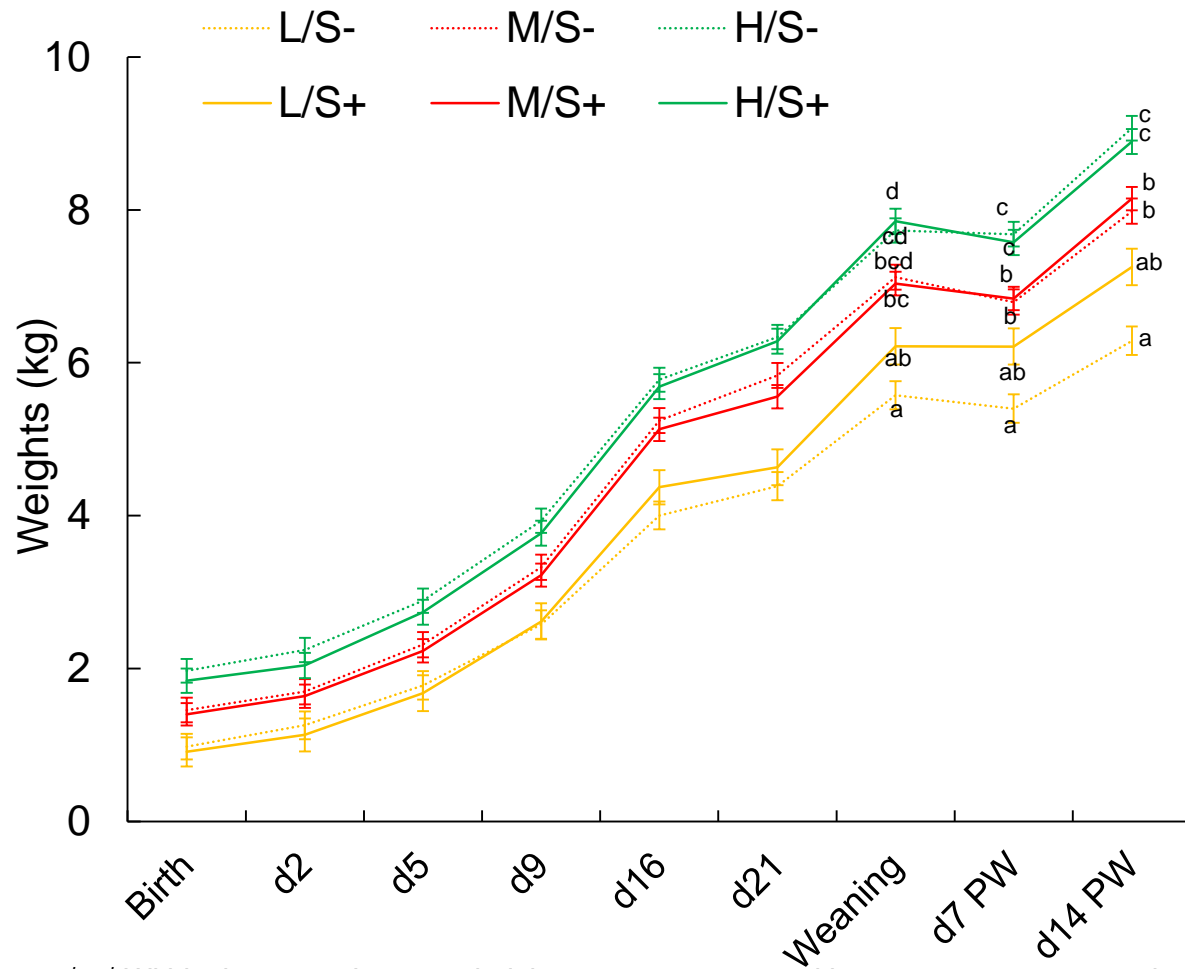
- Litter
- Farrowing series

	S-	S+
Sow parity	3.1 (\pm 1.1)	3.25 (\pm 1.5)
Sow weight (110 d of gestation), kg	285 (\pm 34)	283 (\pm 37)
BCS (110 d of gestation)	4.3 (\pm 0.1)	4.4 (\pm 0.3)
Average piglets birth weight, kg	1.50 (\pm 0.34)	1.49 (\pm 0.44)

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Effect of the supplement on growth performances



L/S- but not L/S+ piglets were lighter at weaning, d7 PW and d14 PW and grew slower ($P < 0.05$) from birth to 14 d PW compared with M/S- and M/S+ piglets

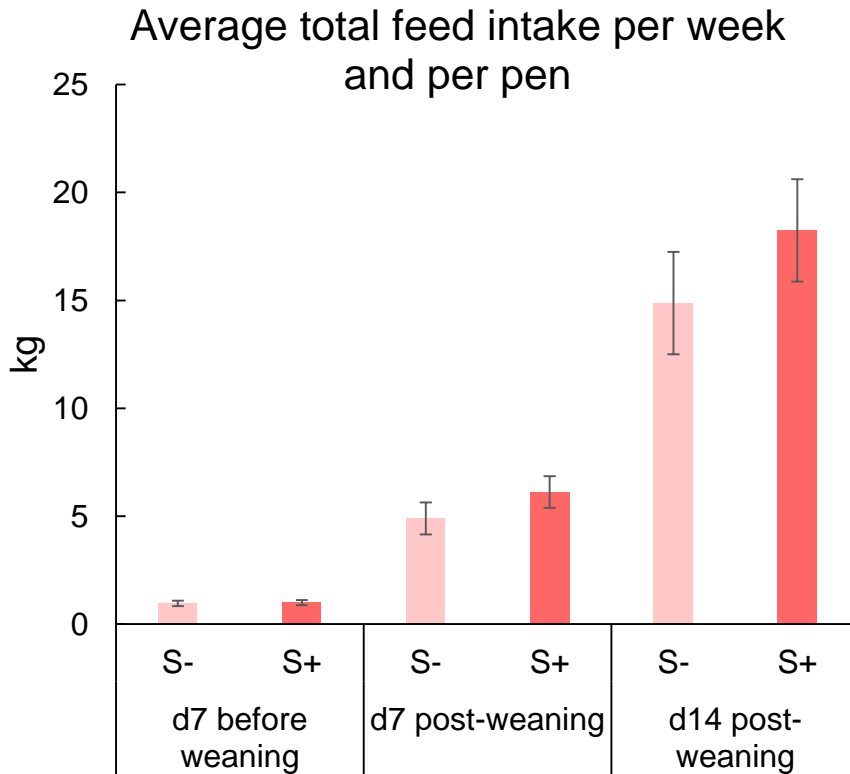
a,b,c,d Within the same day or period, least square means without a common superscripts differ ($P < 0.05$)

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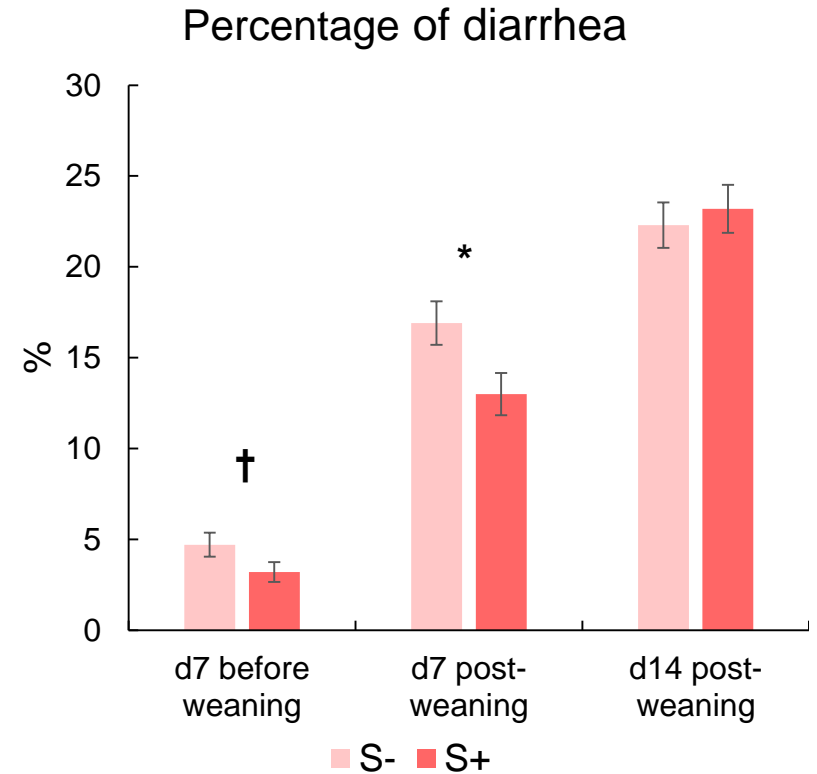
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Feed intake and occurrence of diarrhea



No effect on feed intake



Decrease in diarrhea

* $P < 0.05$
† $0.05 < P < 0.10$

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Introduction

Materials and methods

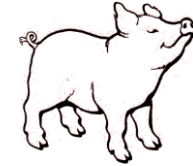
Results

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Effect of the supplement on VFA profile

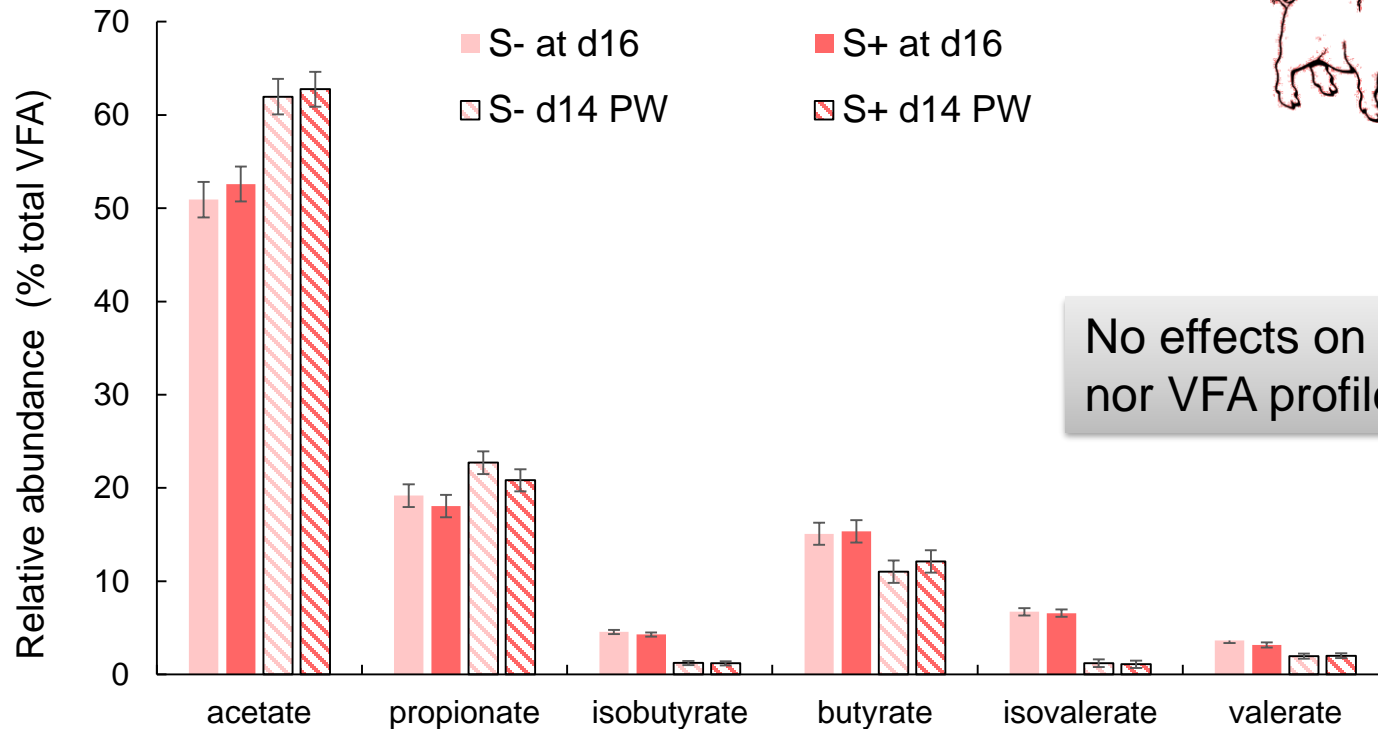
	d16		d14 PW		SEM	P-value Supplement x time
	S-	S+	S-	S+		
Total VFA (mmol/kg)	44.3	56.6	88.5	93.4	6.1	0.46



S-: 1.47 kg



S+: 1.57 kg



No effects on total VFA nor VFA profile

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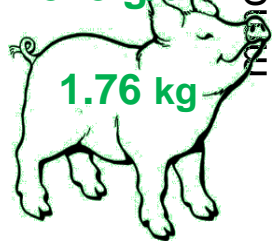
Total VFA of slow- and fast-growth piglets

ADG (d0-16): **177 g/d**



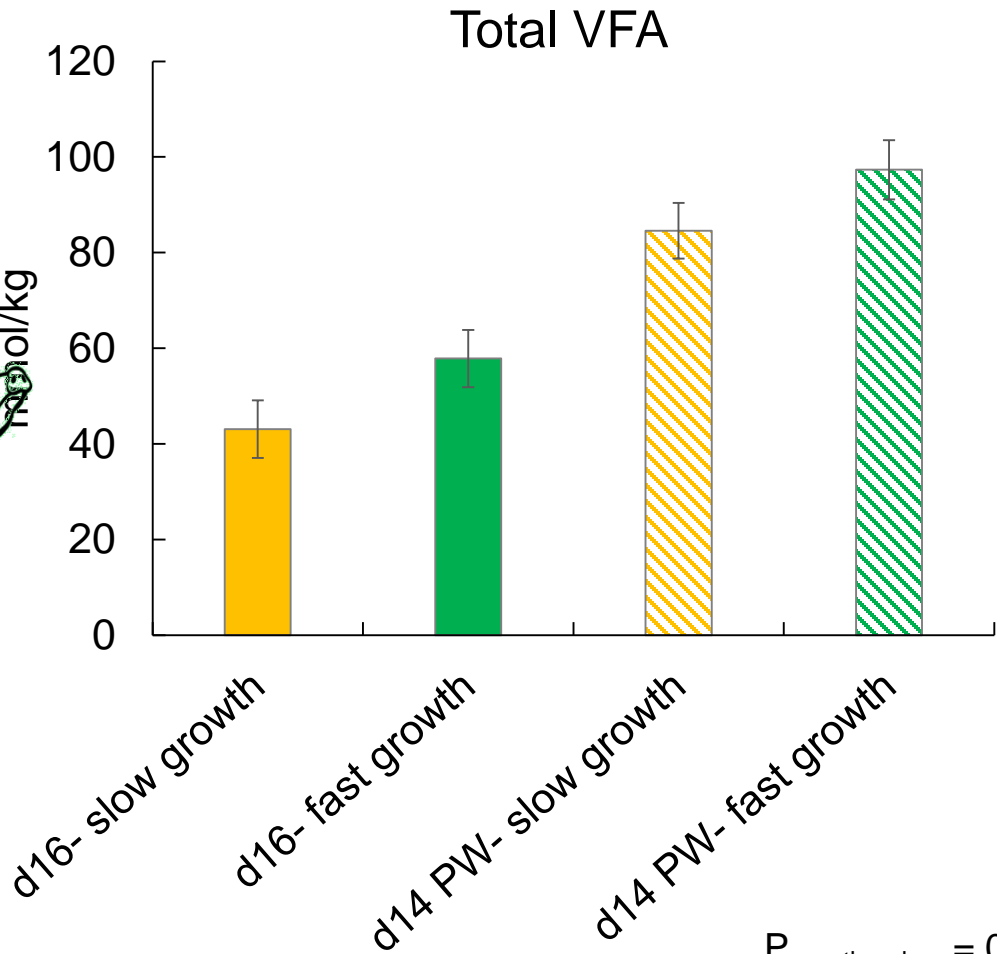
1.28 kg

313 g/d



1.76 kg

No effect on total VFA



$P_{\text{growth} \times \text{days}} = 0.84$

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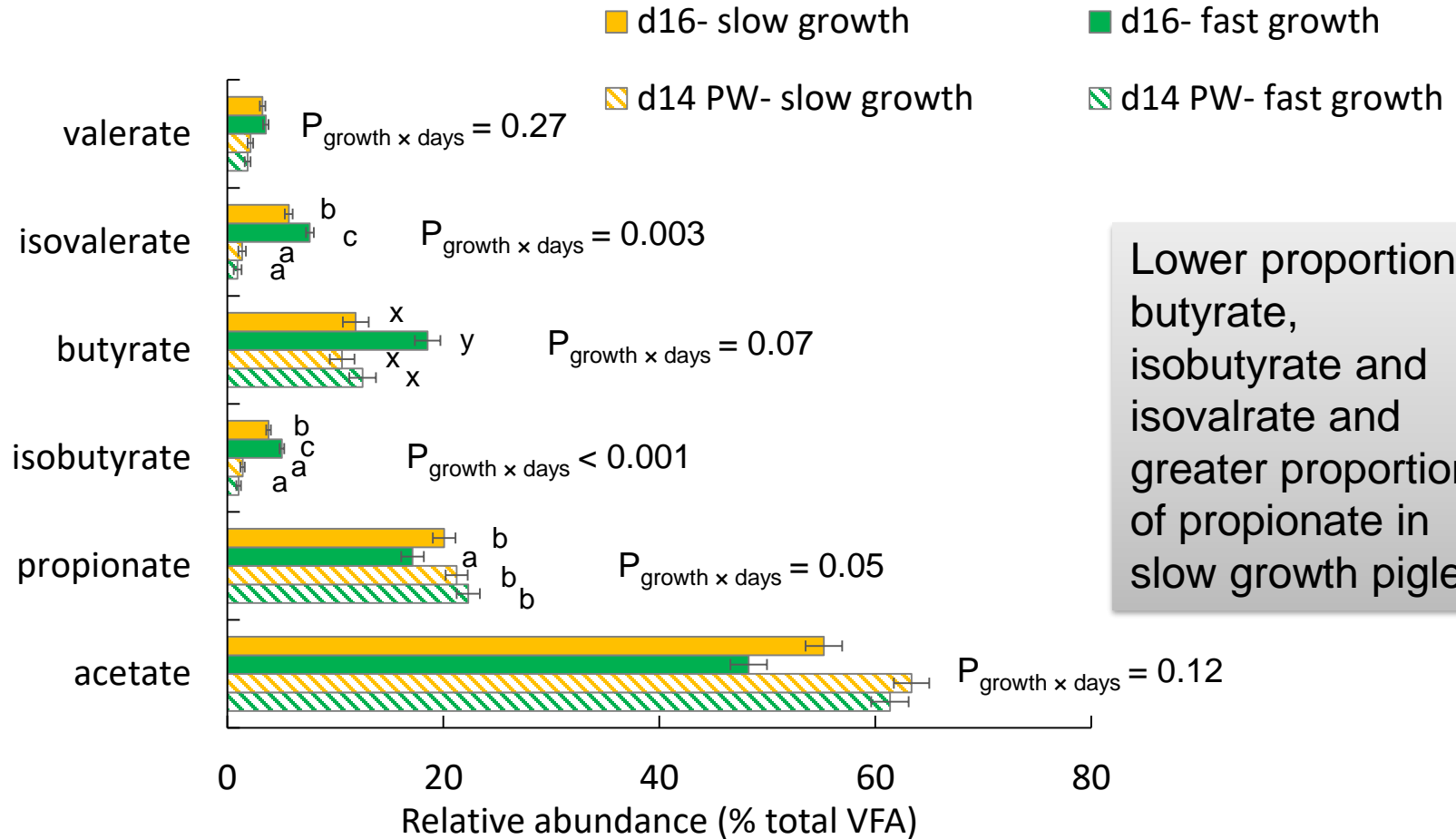
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VFA profile of slow- and fast-growth piglets

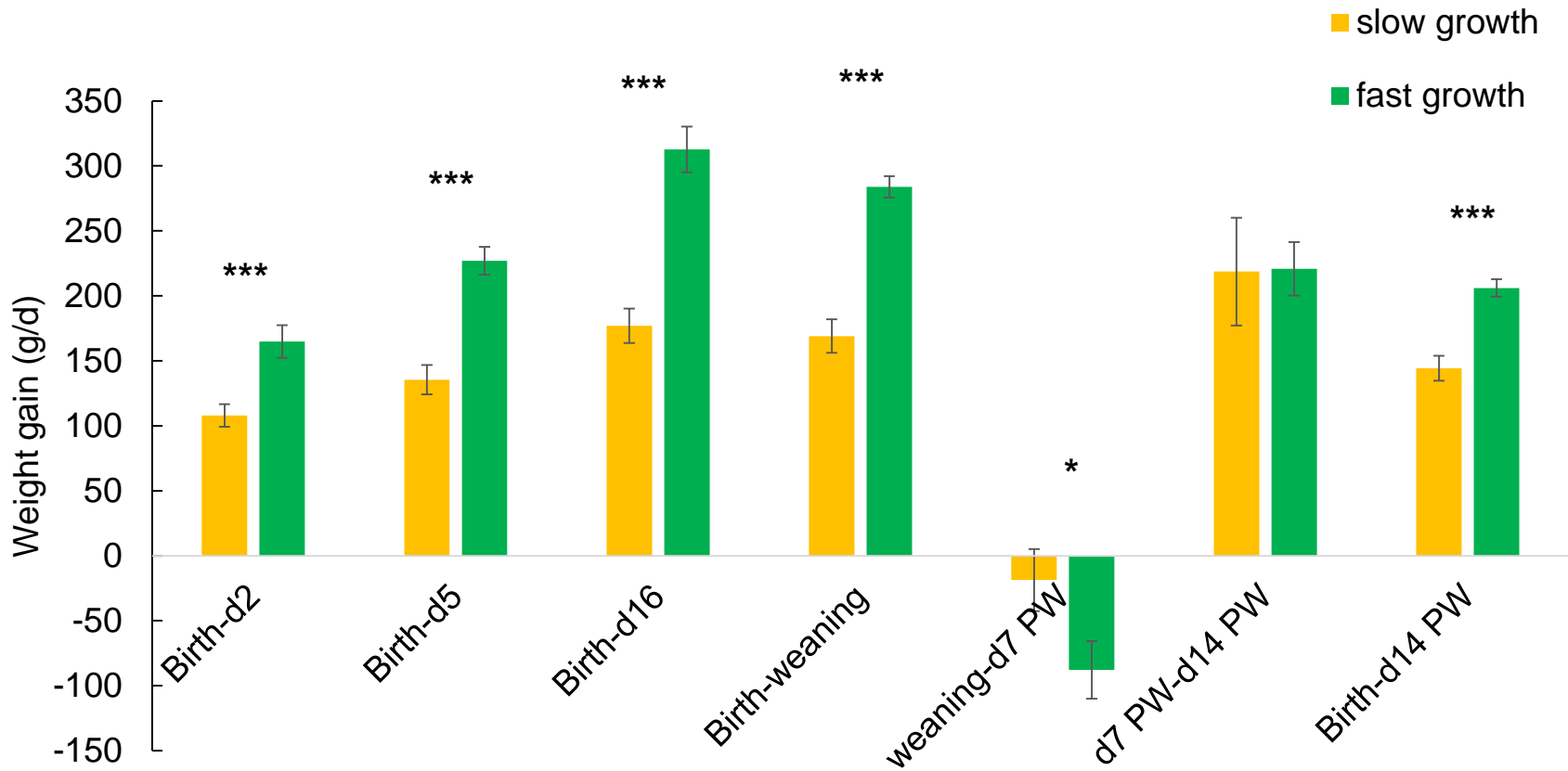


Lower proportion of butyrate, isobutyrate and isovalerate and greater proportion of propionate in slow growth piglets

a,b,c and x,y Least square means without a common superscripts differ (P<0.05) or tend to differ (P< 0.10)

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Do slow growth piglets always have a slow growth?



Yes except around weaning

*** $P < 0.001$

* $P < 0.05$

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Conclusions of this experiment

- Administration of the **supplement in a single dose** seems to:
 - **improve growth of low** birth weight piglets from birth to d14 PW
 - **reduce diarrhea** in the first week after weaning
 - have **no effect on feed intake** and fecal **VFA** profile
- Butyrate, isobutyrate** and **isovalerate** are present in **greater** proportion in the feces of **fast growth** piglet. Solutions that increase their relative abundance might contribute to improve growth performance.

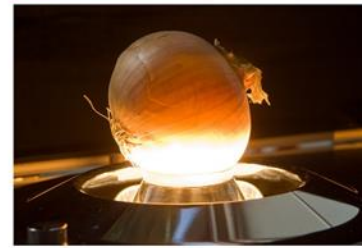


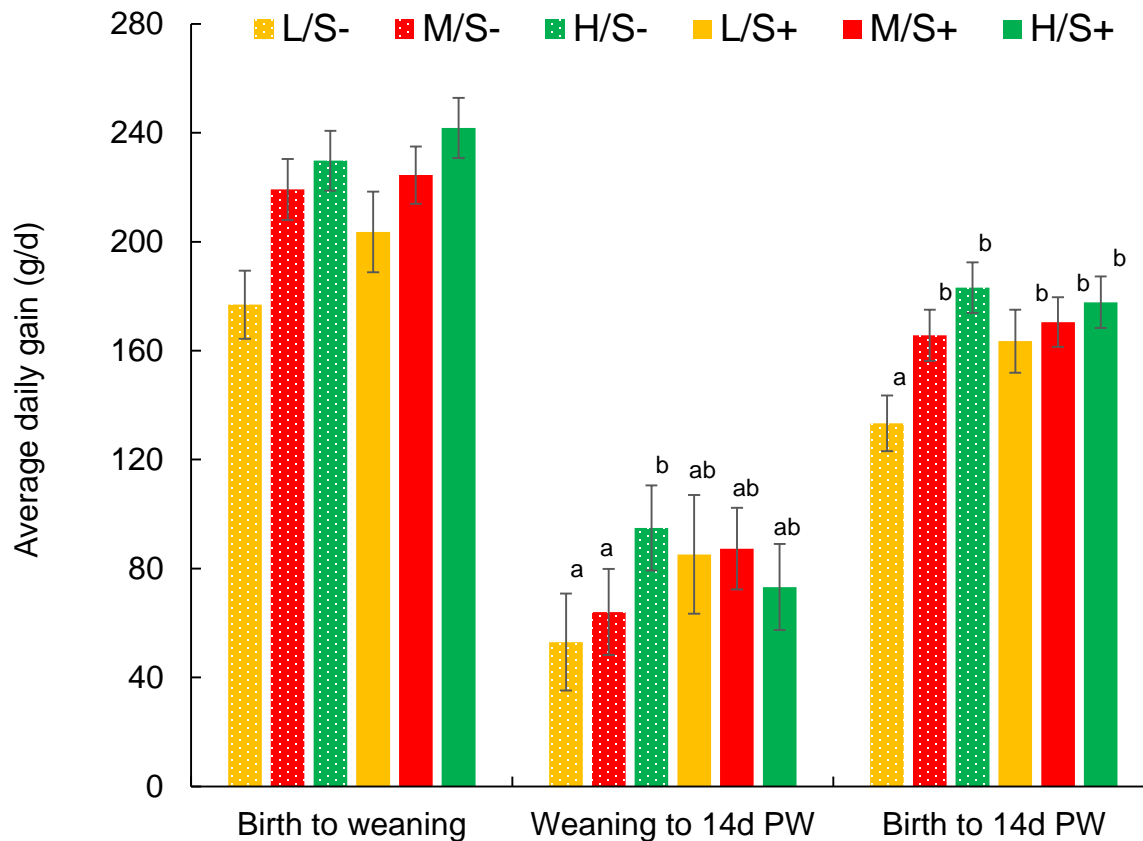


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Growth (\pm SD)

